

CLAIMS

- 1 1. A method for simulating film grain in an image block of M x N pixels, where
2 N and M are integers greater than zero, comprising the steps of:
3 computing the average of the pixel values within the block of M x N pixels;
4 selecting a film grain block of M x N pixels from among a pool of previously
5 established blocks containing film grain as a function of the average value of the image
6 block and a random number; and
7 blending each pixel in the selected film grain block with a corresponding pixel in the
8 image block.
- 1 2. The method according to claim 1 further including the step of accessing a
2 look up table containing random numbers to obtain the random number.
- 1 3. The method according to claim 2 further comprising the step of populating
2 the look-up table in advance of film grain simulation with random numbers generated by a
3 random number generator.
- 1 4. A method for creating a block of M x N pixels with film grain, where N and
2 M are integers greater than zero, comprising the steps of:
3 receiving film grain information that includes at least one parameter that specifies an
4 attribute of the film grain to appear in the block;
5 creating a block of M x N random values selected from a previously established list
6 of Gaussian random numbers;
7 computing an Discrete Cosine Transform of the M x N block of random numbers;
8 filtering the M x N coefficients resulting from the Discrete Cosine Transform by at
least one parameter in the received film grain information;
1 computing an Inverse Discrete Cosine Transform of the filtered set of coefficients;
2 scaling all the pixel values in the block as indicated by one parameter in the received
3 film grain information; and
4 storing the created block of film grain into a pool of film grain blocks.

1 5. The method according to claim 4 further comprising the step of performing an
2 integer approximation of a Discrete Cosine Transform (DCT) and the Inverse Discrete
3 Cosine Transform (IDCT) to reduce complexity.

1 6. The method according to claim 4 further comprising the step of scaling top
2 and bottom edges of the created film grain block to hide block edges.

1 7. The method according to claim 4 wherein the step of receiving the film grain
2 information further comprises the step of decoding a Supplemental Enhancement
3 Information message containing the at least one parameter.

1 8. Apparatus for simulating film grain in an image block of $M \times N$ pixels, where
2 N and M are integers greater than zero, comprising:
3 means for computing the average of the pixel values within the block of $M \times N$
4 pixels;
5 means for selecting a film grain block of $M \times N$ pixels from among a pool of
6 previously established blocks containing film grain as a function of the average value of the
7 image block and a random number; and
8 means for blending each pixel in the selected film grain block with a corresponding
9 pixel in the image block.

1 9. The apparatus according to claim 8 further a look up table containing random
2 numbers to obtain the random number.

1 10. The method according to claim 9 where the look-up table is populated in
2 advance of film grain simulation with random numbers generated by a random number
3 generator.

11. An apparatus for creating a block of $M \times N$ pixels with film grain, where N
and M are integers greater than zero, comprising:
 means for receiving film grain information that includes at least one parameter that
specifies an attribute of the film grain to appear in the block;

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means for creating a block of $M \times N$ random values selected from a previously established list of Gaussian random numbers;

means for computing an Discrete Cosine Transform of the $M \times N$ block of random numbers;

means for filtering the $M \times N$ coefficients resulting from the Discrete Cosine Transform by at least one parameter in the received film grain information;

means for computing an Inverse Discrete Cosine Transform of the filtered set of coefficients;

means for scaling all the pixel values in the block as indicated by one parameter in the received film grain information; and

means for storing the created block of film grain into a pool of film grain blocks.

1 12. The apparatus according to claim 11 further comprising means for performing
2 an integer approximation of a Discrete Cosine Transform (DCT) and the Inverse Discrete
3 Cosine Transform (IDCT) to reduce complexity.

1 13. The apparatus according to claim 11 further comprising the means for scaling
2 top and bottom edges of the created film grain block to hide block edges.

1 14. The apparatus according to claim 11 wherein means for receiving the film
2 grain information further comprises means for decoding a Supplemental Enhancement
3 Information message containing the at least one parameter.

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